

Serial No. 10/602,074

July 6, 2004

Reply to the Office Action dated April 16, 2004

Page 2 of 11

AMENDMENTS TO THE CLAIMS:

This listing of claims will replace all prior versions, and listings, of claims in the application:

LISTING OF CLAIMS:

Claims 1-8 (canceled)

Claim 9 (currently amended): A piezoelectric type electric acoustic converter comprising:

a plurality of piezoelectric ceramic layers which are laminated to define a laminate, all of the plurality of piezoelectric ceramic layers being polarized in the same direction which is a thickness direction of said laminate;

main surface electrodes disposed on front and back main surfaces of said laminate;

an internal electrode disposed between a respective pair of said polarized piezoelectric ceramic layers; and

a resin layer arranged to cover ~~substantially all of the~~ front and back surfaces of the laminate; wherein

said main surface electrodes, said internal electrode and said polarized piezoelectric ceramic layers are constructed and arranged to cause the piezoelectric type electric acoustic converter to generate bending vibration in response to application of an alternating signal between the main surface electrodes and the internal electrode; and

the resin layer is not disposed on side surfaces of the laminate.

Claim 10 (previously presented): A piezoelectric type electric acoustic converter according to Claim 9, wherein the resin layer is a stiffened coating layer.

Serial No. 10/602,074
July 6, 2004
Reply to the Office Action dated April 16, 2004
Page 3 of 11

Claim 11 (previously presented): A piezoelectric type electric acoustic converter according to Claim 10, further comprising a paste resin film disposed below the stiffened resin coating layer.

Claim 12 (previously presented): A piezoelectric type electric acoustic converter according to Claim 9, wherein the resin layer is a resin film bonded to the laminate.

Claim 13 (previously presented): A piezoelectric type electric acoustic converter according to Claim 9, wherein the laminate body has a substantially rectangular shape.

Claim 14 (previously presented): A piezoelectric type electric acoustic converter according to Claim 9, wherein the main surface electrodes on the front and back surfaces are mutually conducted via a first side electrode disposed on a side of the laminate, and the internal electrode is conducted with a second side electrode disposed on a side of a position which is different from the first side electrode.

Claim 15 (previously presented): A piezoelectric type electric acoustic converter according to Claim 14, wherein the first and second side electrodes are arranged to extend onto the front and back surfaces of the resin layers.

Claim 16 (previously presented): A piezoelectric type electric acoustic converter according to Claim 14, wherein the second side electrode is arranged to extend onto the front and back surfaces of the laminate, and the resin layers are provided with a first notch where a portion of the main surface electrode on the front and back surfaces are exposed, and a second notch where a portion of the second side electrodes turning to the front and back surfaces of the laminate are exposed.

Serial No. 10/602,074
July 6, 2004
Reply to the Office Action dated April 16, 2004
Page 4 of 11

Claim 17 (previously presented): A piezoelectric type electric acoustic converter according to Claim 9, wherein the resin layer is made of a material having a Young's modulus of about 1100 MPa.

Claim 18 (previously presented): A piezoelectric type electric acoustic converter according to Claim 9, wherein the bending vibration generated in the piezoelectric type electric acoustic converter is a length bending mode.

Claim 19 (previously presented): A piezoelectric type electric acoustic converter according to Claim 9, wherein the direction of an electric field in one of the plurality of piezoelectric ceramic layers is opposite to that of another of the plurality of piezoelectric ceramic layers.

Claim 20 (previously presented): A piezoelectric type electric acoustic converter according to Claim 9, wherein the laminate defines a bimorph diaphragm.

Claim 21 (new): A piezoelectric type electric acoustic converter according to Claim 9, wherein side surface electrodes are disposed on side surfaces of the laminate and extend onto a surface of the resin.

Claim 22 (new): A piezoelectric type electric acoustic converter according to Claim 9, wherein the resin layer is arranged to cover substantially all of the front and back surfaces of the laminate.

Claim 23 (new): A piezoelectric type electric acoustic converter comprising:

Serial No. 10/602,074

July 6, 2004

Reply to the Office Action dated April 16, 2004

Page 5 of 11

a plurality of piezoelectric ceramic layers which are laminated to define a laminate, all of the plurality of piezoelectric ceramic layers being polarized in the same direction which is a thickness direction of said laminate;

main surface electrodes disposed on front and back main surfaces of said laminate;

an internal electrode disposed between a respective pair of said polarized piezoelectric ceramic layers; and

a resin layer arranged to cover only the front and back surfaces of the laminate; wherein

said main surface electrodes, said internal electrode and said polarized piezoelectric ceramic layers are constructed and arranged to cause the piezoelectric type electric acoustic converter to generate bending vibration in response to application of an alternating signal between the main surface electrodes and the internal electrode.

Claim 24.(new): A piezoelectric type electric acoustic converter according to Claim 23, wherein the resin layer is a stiffened coating layer.

Claim 25 (new): A piezoelectric type electric acoustic converter according to Claim 24, further comprising a paste resin film disposed below the stiffened resin coating layer.

Claim 26 (new): A piezoelectric type electric acoustic converter according to Claim 23, wherein the resin layer is a resin film bonded to the laminate.

Claim 27 (new): A piezoelectric type electric acoustic converter according to Claim 23, wherein the laminate body has a substantially rectangular shape.

Serial No. 10/602,074

July 6, 2004

Reply to the Office Action dated April 16, 2004

Page 6 of 11

Claim 28 (new): A piezoelectric type electric acoustic converter according to Claim 23, wherein the main surface electrodes on the front and back surfaces are mutually conducted via a first side electrode disposed on a side of the laminate, and the internal electrode is conducted with a second side electrode disposed on a side of a position which is different from the first side electrode.

Claim 29 (new): A piezoelectric type electric acoustic converter according to Claim 28, wherein the first and second side electrodes are arranged to extend onto the front and back surfaces of the resin layers.

Claim 30 (new): A piezoelectric type electric acoustic converter according to Claim 28, wherein the second side electrode is arranged to extend onto the front and back surfaces of the laminate, and the resin layers are provided with a first notch where a portion of the main surface electrode on the front and back surfaces are exposed, and a second notch where a portion of the second side electrodes turning to the front and back surfaces of the laminate are exposed.

Claim 31 (new): A piezoelectric type electric acoustic converter according to Claim 23, wherein the resin layer is made of a material having a Young's modulus of about 1100 MPa.

Claim 32 (new): A piezoelectric type electric acoustic converter according to Claim 23, wherein the bending vibration generated in the piezoelectric type electric acoustic converter is a length bending mode.

Claim 33 (new): A piezoelectric type electric acoustic converter according to Claim 23, wherein the direction of an electric field in one of the plurality of piezoelectric

Serial No. 10/602,074

July 6, 2004

Reply to the Office Action dated April 16, 2004

Page 7 of 11

ceramic layers is opposite to that of another of the plurality of piezoelectric ceramic layers.

Claim 34 (new): A piezoelectric type electric acoustic converter according to Claim 23, wherein the laminate defines a bimorph diaphragm.

Claim 35 (new): A piezoelectric type electric acoustic converter according to Claim 23, wherein side surface electrodes are disposed on side surfaces of the laminate and extend onto a surface of the resin.

Claim 36 (new): A piezoelectric type electric acoustic converter according to Claim 23, wherein the resin layer is arranged to cover substantially all of the front and back surfaces of the laminate.